

ATTORNEY DOCKET NO.: 05015.0365U1

App. Serial No.: 09/662,965

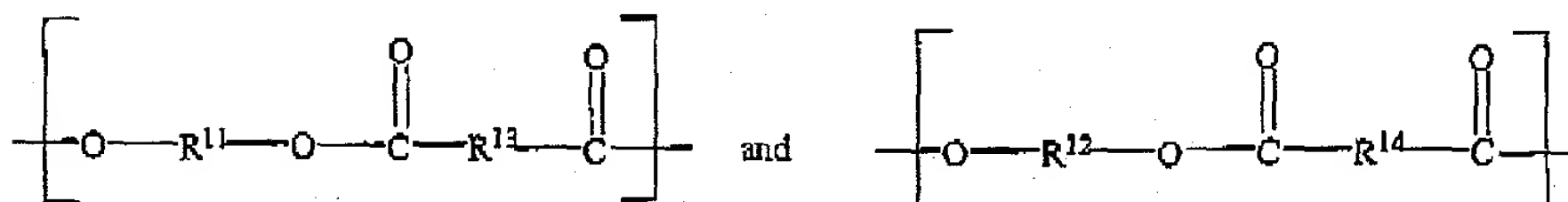
**IN THE CLAIMS**

1. (Four times amended) A method for preparing an article from a biodegradable polymer composition wherein the method comprises:

- a. introducing a phenol-containing compound comprising terpene-phenol resin into a biodegradable polymer or biodegradable polymer composition in an amount sufficient to slow the degradation rate of the biodegradable polymer or biodegradable polymer composition; and
- b. mixing the phenol-containing compound with the biodegradable polymer or biodegradable polymer composition;

wherein the biodegradable polymer or biodegradable polymer composition [comprises] consists essentially of [one or more of the following]:

1. an aliphatic-aromatic copolyester having repeat units of the following structures:



wherein

- (i)  $\text{R}^{11}$  and  $\text{R}^{12}$  are the same or different, and are residues of one or more of diethylene glycol, propylene glycol, 1,3-propanediol, 2,2-dimethyl-1,3-propanediol, 1,3-butanediol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 2,2,4-trimethyl-1,6-hexanediol, thiodiethanol, 1,3-cyclohexanedimethanol, 1,4-cyclohexanedimethanol, 2,2,4,4-tetramethyl-1,3-cyclobutanediol, triethylene glycol, or tetraethylene glycol;
- (ii)  $\text{R}^{11}$  and  $\text{R}^{12}$  are 100% of the diol components in the copolyester;

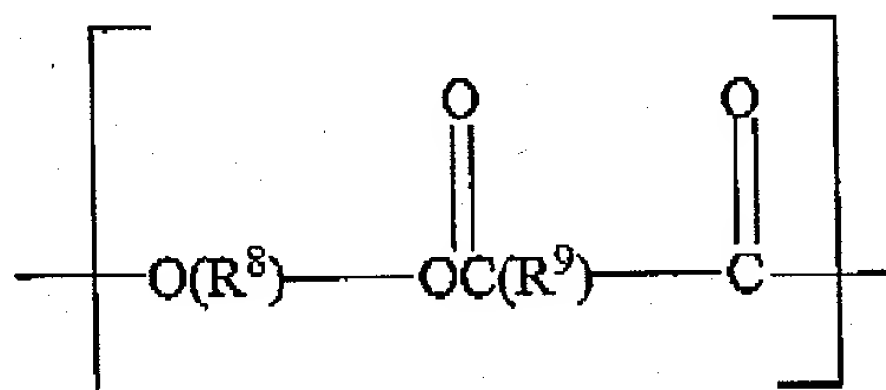
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(iii)  $R^{13}$  is absent or is selected from one or more of the groups consisting of  $C_1 - C_{12}$  alkylene or oxyalkylene;  $C_1 - C_{12}$  alkylene or oxyalkylene substituted with one to four substituents independently selected from the group consisting of halo,  $C_6 - C_{10}$  aryl, and  $C_1 - C_4$  alkoxy;  $C_5 - C_{10}$  cycloalkylene; and  $C_5 - C_{10}$  cycloalkylene substituted with one to four substituents independently selected from the group consisting of halo,  $C_6 - C_{10}$  aryl, and  $C_1 - C_4$  alkoxy; and

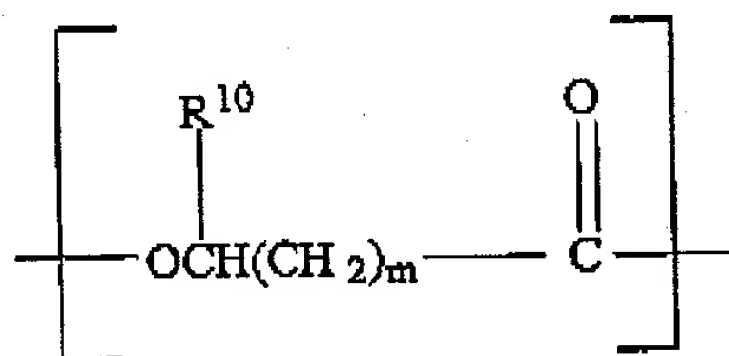
(iv)  $R^{14}$  is selected from one or more of the groups consisting of  $C_6 - C_{10}$  aryl, and  $C_6 - C_{10}$  aryl substituted with one to four substituents independently selected from the group consisting of halo,  $C_1 - C_4$  alkyl, and  $C_1 - C_4$  alkoxy;

[2. an aliphatic polyester having repeat units of one or more of the



following structures:

or



wherein  $m$  is an integer of from 0 to 10, and  $R^{10}$  is selected from the group consisting of hydrogen;  $C_1 - C_{12}$  alkyl;  $C_1 - C_{12}$  alkyl substituted with one to four substituents independently selected from the group consisting of halo,  $C_6 - C_{10}$  aryl, and  $C_1 - C_4$  alkoxy;  $C_5 - C_{10}$  cycloalkyl; and  $C_5 - C_{10}$  cycloalkyl

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substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy, wherein R<sup>8</sup> is selected from the group consisting of C<sub>2</sub>-C<sub>12</sub> alkylene or C<sub>2</sub>-C<sub>12</sub> oxyalkylene; C<sub>2</sub>-C<sub>12</sub> alkylene or C<sub>2</sub>-C<sub>12</sub> oxyalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy; C<sub>5</sub>-C<sub>10</sub> cycloalkylene; C<sub>5</sub>-C<sub>10</sub> cycloalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy, and

wherein R<sup>9</sup> is absent or is selected from one or more of the group consisting of C<sub>1</sub>-C<sub>12</sub> alkylene or oxyalkylene; C<sub>1</sub>-C<sub>12</sub> alkylene or oxyalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy; C<sub>5</sub>-C<sub>10</sub> cycloalkylene; and C<sub>5</sub>-C<sub>10</sub> cycloalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy; and

3) a C<sub>1</sub>-C<sub>10</sub> cellulose ester having a DS equal to or less than about 2.5;] and

c. forming the biodegradable polymer composition into an article, wherein the article comprises: a film, a bottle, a blow molded article, an injection molded article or a container, and wherein the article exhibits a delayed biodegradation rate over an article formed from a biodegradable polymer composition not including the phenol-containing compound.

2. The method of claim 1 wherein the terpene-phenol resin comprises from about 1 to about 40 % by weight of phenol as measured by weight of the compound.

3. The method of claim 1 wherein the terpene-phenol resin comprises from about 5 to about 20 % by weight of phenol as measured by weight of the compound.

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4. The method of claim 1 wherein the phenol-containing compound is present in the biodegradable polymer or biodegradable polymer composition at from about 0.5 to about 10 weight % as measured by the total weight of the biodegradable polymer or biodegradable polymer composition.
5. The method of claim 1 wherein the phenol-containing compound is present in the biodegradable polymer or biodegradable polymer composition at from about 1 to about 3 weight % as measured by the total weight of the biodegradable polymer or biodegradable polymer composition.
6. (Canceled)
7. (Three Times Amended) The method of claim 1 wherein [the biodegradable polymer or biodegradable polymer composition comprises] the aliphatic-aromatic copolyester and wherein  $R^{11}$  and  $R^{12}$  are the same or different, and are selected from the group consisting of residues of one or more of diethylene glycol, propylene glycol, 1,3-propanediol, 1,3-butanediol, and 1,4-butanediol,  $R^{13}$  is selected from the group consisting of malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, 2,2-dimethyl glutaric acid, diglycolic acid, and an ester forming derivative thereof, and  $R^{14}$  is selected from the group consisting of one or more of 1,4-terephthalic acid, 1,3-terephthalic acid, 2,6-naphthoic acid, 1,5-naphthoic acid, and an ester forming derivative thereof.
8. (Canceled)
9. The method of claim 1, wherein the biodegradable polymer or biodegradable polymer composition comprises one or more of: a pigment, a dye, an opacifying agent, an antioxidant, an ultraviolet stabilizer, an optical brightener, an aliphatic acid, a metal salt, an antistatic agent, an antiblocking aid, a filler, a dispersing agent, a coating aid, a slip agent, a lubricant, starch, wood, and flour.

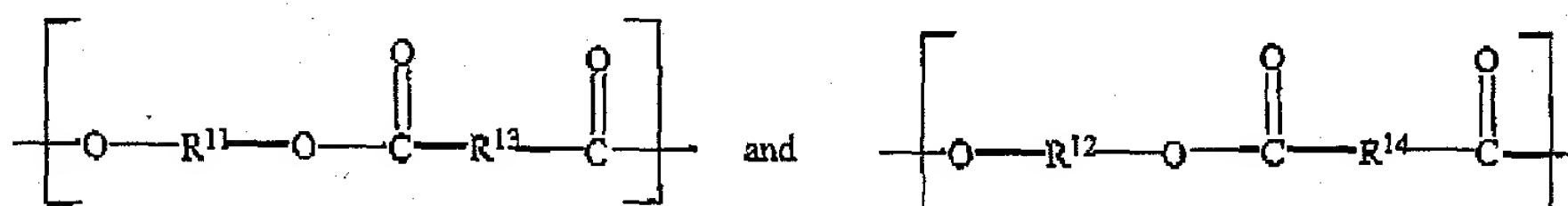
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10. - 21. (Canceled)

22. (Four times amended) A biodegradable polymer composition for making an article comprising a film, a bottle, a blow molded article, an injection molded article or a container, wherein the biodegradable polymer or biodegradable polymer-second material composition comprises:

- a. a phenol-containing compound comprising terpene-phenol resin incorporated in the biodegradable polymer or biodegradable polymer-second material composition, the phenol-containing compound being present at an amount sufficient to slow the degradation rate of the biodegradable polymer or biodegradable polymer second-material composition; and
- b. a biodegradable polymer or biodegradable polymer-second material composition [comprising one or more of the following] consisting essentially of:
  1. an aliphatic-aromatic copolyester having repeat units of the following structures:



wherein

- (i)  $\text{R}^{11}$  and  $\text{R}^{12}$  are the same or different, and are residues of one or more of diethylene glycol, propylene glycol, 1,3-propanediol, 2,2-dimethyl-1,3-propanediol, 1,3-butanediol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 2,2,4-trimethyl-1,6-hexanediol, thiodiethanol, 1,3-cyclohexanedimethanol, 1,4-cyclohexanedimethanol, 2,2,4,4-tetramethyl-1,3-cyclobutanediol, triethylene glycol, or tetraethylene glycol;
- (ii)  $\text{R}^{11}$  and  $\text{R}^{12}$  are 100% of the diol components in the copolyester;



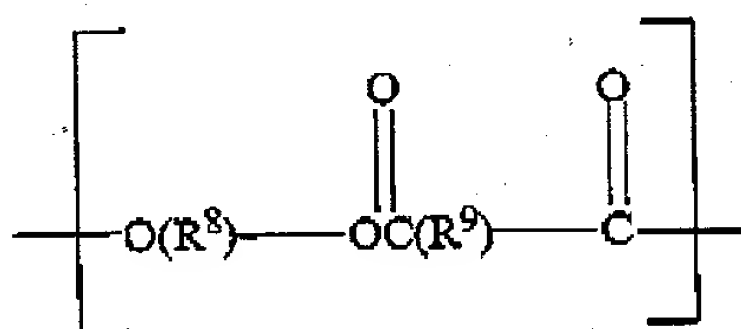
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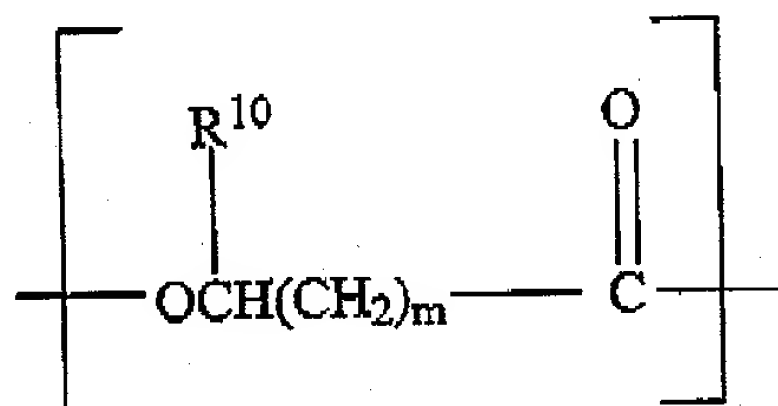
(iii)  $R^{13}$  is absent or is selected from one or more of the groups consisting of  $C_1 - C_{12}$  alkylene or oxyalkylene;  $C_1 - C_{12}$  alkylene or oxyalkylene substituted with one to four substituents independently selected from the group consisting of halo,  $C_6 - C_{10}$  aryl, and  $C_1 - C_4$  alkoxy;  $C_5 - C_{10}$  cycloalkylene; and  $C_5 - C_{10}$  cycloalkylene substituted with one to four substituents independently selected from the group consisting of halo,  $C_6 - C_{10}$  aryl, and  $C_1 - C_4$  alkoxy; and

(iv)  $R^{14}$  is selected from one or more of the groups consisting of  $C_6 - C_{10}$  aryl, and  $C_6 - C_{10}$  aryl substituted with one to four substituents independently selected from the group consisting of halo,  $C_1 - C_4$  alkyl, and  $C_1 - C_4$  alkoxy;

[2) an aliphatic polyester having repeat units of one or more of the following structures:



or



wherein  $m$  is an integer of from 0 to 10, and  $R^{10}$  is selected from the group consisting of hydrogen;  $C_1 - C_{12}$  alkyl;  $C_1 - C_{12}$  alkyl substituted with one to four substituents independently selected from the group consisting of halo,  $C_6 - C_{10}$  aryl, and  $C_1 - C_4$  alkoxy;  $C_5 - C_{10}$  cycloalkyl; and  $C_5 - C_{10}$  cycloalkyl

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substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy, wherein R<sup>8</sup> is selected from the group consisting of C<sub>2</sub>-C<sub>12</sub> alkylene or C<sub>2</sub>-C<sub>12</sub> oxyalkylene; C<sub>2</sub>-C<sub>12</sub> alkylene or C<sub>2</sub>-C<sub>12</sub> oxyalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy; C<sub>5</sub>-C<sub>10</sub> cycloalkylene; C<sub>5</sub>-C<sub>10</sub> cycloalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy, and

wherein R<sup>9</sup> is absent or is selected from one or more of the group consisting of C<sub>1</sub>-C<sub>12</sub> alkylene or oxyalkylene; C<sub>1</sub>-C<sub>12</sub> alkylene or oxyalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy; C<sub>5</sub>-C<sub>10</sub> cycloalkylene; and C<sub>5</sub>-C<sub>10</sub> cycloalkylene substituted with one to four substituents independently selected from the group consisting of halo, C<sub>6</sub>-C<sub>10</sub> aryl, and C<sub>1</sub>-C<sub>4</sub> alkoxy; and

3) C<sub>1</sub>-C<sub>10</sub> cellulose ester having a DS equal to or less than about 2.5,]

and wherein the article exhibits a delayed biodegradation rate over an article formed from a biodegradable polymer composition not including the phenol-containing compound.

23. (Canceled)

24. (Twice amended) The biodegradable polymer composition of claim 22 wherein [the biodegradable polymer or biodegradable polymer-second material composition comprises the aliphatic-aromatic copolyester and wherein] R<sup>11</sup> and R<sup>12</sup> are the same or different, and are selected from the group consisting of residues of one or more of diethylene glycol, propylene glycol, 1,3-propanediol, 1,3-butanediol, and 1,4-butanediol, R<sup>13</sup> is selected from the group consisting of malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, 2,2-dimethyl glutaric acid, diglycolic acid, and an ester forming derivative thereof, and R<sup>14</sup> is

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selected from the group consisting of one or more of 1,4-terephthalic acid, 1,3-terephthalic acid, 2,6-naphthoic acid, 1,5-naphthoic acid, and an ester forming derivative thereof.

- 25 The biodegradable polymer composition of claim 22 wherein the phenol-containing compound comprises from about 1 to about 40 % by weight of phenol as measured by weight of the compound.
26. The biodegradable polymer composition of claim 22 wherein the phenol-containing compound is present in the biodegradable polymer composition in amount of from about 0.5 to about 10 weight % as measured by weight of the biodegradable polymer composition.
27. The biodegradable polymer composition of claim 22 wherein the phenol-containing compound is present in the biodegradable composition in an amount of from about 1 to about 3 weight % as measured by weight of the biodegradable polymer composition.
28. The biodegradable polymer composition of claim 22, further comprising one or more of a pigment, a dye, an opacifying agent, an antioxidant, an ultraviolet stabilizer, an optical brightener, an aliphatic acid, a metal salt, an antistatic agent, an antiblocking aid, a filler, a dispersing agent, a coating aid, a slip agent, a lubricant, starch, wood, and flour.

**REMARKS**

The Office Action has rejected claims 1-5, 7, 9, 22 and 24-28. Claims 1 and 22 are amended herewith as further described below.

As an initial matter, Applicants wish to thank Examiner Short for the courtesies extended in the telephone interview of July 28, 2003 with Applicants' representative Jacqueline Hutter. As discussed in that interview, Applicants have herewith amended



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claims 1 and 22 to recite the transitional phrase "consisting essentially of" in relation to the biodegradable polymer aspect of these claims. Claims 1 and 22 have further been amended to delete the previously claimed aliphatic polyester and cellulose ester aspects. Claims 7 and 24 have been amended to conform these claims to the amendments of claims 1 and 22 respectively. Each of these amendments is made without prejudice. Additionally, Applicants are herewith submitting a Declaration under 37 C.F.R. 1.132 to demonstrate the patentability the claims over the Blumenthal *et al.* reference. As discussed in the July 28, 2003 telephone interview, Applicants believe the claims are now in condition for allowance.

## **II. Rejection in Light of Blumenthal**

The Office Action has rejected claims 1-5, 7, 9-11, 14-15, 17-18, 21-22 and 24-28<sup>1</sup> under 35 U.S.C. § 102(b) as being anticipated or obvious over Blumenthal *et al.* (U.S. Patent No. 5,750,605). In particular, the Office Action asserts that the aliphatic-aromatic copolyester "encompasses the sulfonated polyester of that reference."

Claims 1 and 22 have been amended herewith to specifically recite the transitional phrase "consisting essentially of." As such, the present claims necessarily exclude materials that would change the basic and novel characteristics of the invention.

The reference at issue, Blumenthal *et al.* discloses polyester materials having sulfonated groups. As disclosed therein and as explained in the Irick, Jr. Declaration submitted herewith, such groups make the polyesters of Blumenthal *et al.* sensitive to water. In particular, Blumenthal *et al.* states that water solubility or sensitivity of the hot melt materials therein results from the presence of sulfonated groups. (col. 5, line 21). Moreover, Blumenthal indicates that such water solubility or sensitivity is a desired feature of the hot melt materials of that invention. In particular, Blumenthal states "[f]or various applications, it is also desired that some hot melt adhesives be hydrophilic, i.e., be water-soluble, water-sensitive or water activated" (col. 1, line 42). It also states that that "[t]he present invention stems from the growing need for hydrophilic materials...." Thus, Blumenthal *et al.* is directed toward a water soluble or water sensitive hot melt

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material and such properties are conferred by the presence of sulfonated groups in the compositions therein.

Claim 1 of the present invention recites methods of making an article from the specified composition, where the article comprises a film, a bottle, a blow molded article, an injection molded article or a container. Further, claim 22 of the present invention recites a composition suitable for preparing an article where the article is a film, a bottle, a blow molded article, an injection molded article or a container. As set forth in the Irick, Jr. Declaration, it would be disadvantageous to such articles for them to be either water soluble or swellable by water. Therefore, the presence of sulfonated groups in the aliphatic-aromatic copolyesters of the present invention would change the basic and novel characteristics of the present invention and, as such, are necessarily excluded from the claims as amended. Accordingly, it is respectfully submitted that the claims, as amended herewith, are allowable over the Blumenthal *et al.* reference.

### III. Rejection in light of Schoenberg, Rutherford, Iovine or Kaufman and Japanese '903

The Office Action has rejected claims 1-5, 9-11, 14-15, 17-18, 21-22 and 25-28 under 35 U.S.C. § 102(b) or, alternatively, as obvious in view of Schoenberg, Rutherford, Iovine or Kaufman as was asserted in a prior Office Action. The Office Action further rejected claims 1-5, 9-11, 14-15, 17-18 21-22 and 24-28 under 35 U.S.C. § 102(b) or, alternatively, as obvious in view of Japanese '903. Applicants have amended claims 1 and 22 herewith to delete reference to the aliphatic polyester and cellulose ester components previously recited in these claims. As discussed in the telephone interview of July 28, 2003, amendment of the claims to delete these previously claimed aspects is believed to make the present claims allowable over each of these references.

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<sup>1</sup> In the Amendment dated February 21, 2003, Applicants deleted claims 10-11, 14-15, 17-18 and 21, without prejudice. Thus, it appears that the Office Action inadvertently included these canceled claims in the present rejection.